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## TOOTH FOR AN EXCAVATOR BUCKET.

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## FIELD OF THE INVENTION

5 The present invention concerns a tooth for buckets of excavators or suchlike, consisting of a work element with a pointed shape, also called point, and a relative support element, or point-bearer, associated with each other by pin means.

## BACKGROUND OF THE INVENTION

10 Buckets for excavators of a known type substantially comprise an open box-like body, constrained to the mechanical arm of the excavator, on one side of which a plurality of teeth are mounted.

15 Each tooth consists of two components: a support element, or point-bearer, attached to the side of the box-like body of the bucket, and a work element, or point, associated with said point-bearer due to their coupling shape and constrained thereto by means of a pin element.

20 To be more exact, at the front the point-bearer has a wedge-shaped protrusion able to be inserted in a cavity of a mating shape made in the rear part of the point; the pin element is arranged transverse, and substantially through, in a seating made on said wedge-shaped  
25 protrusion and on the walls of the cavity of the point.

This type of tooth allows the point to be interchangeable, when it has become worn due to the knocks and high loads to which it is subject when the bucket is used.

30 However, the loads acting on the point determine considerable stresses which are transmitted from the point itself to the pin element and from the latter to the point-bearer, frequently entailing a premature wear,

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if not damage or breakages, both of the pin element and also of the surfaces of the point and the point-bearer in contact with the pin element.

To be more exact, the pin element which is substantially put in direct contact with the point, is subject to considerable forces which are then transferred to the point-bearer, precisely in correspondence with the wedge-shaped protrusion, that is, in correspondence with the part where its section is weakened due to the presence of the insertion seating of the pin element.

This situation can therefore entail, even frequently, the need to completely replace the teeth of the bucket, with long periods of inactivity of the excavators and an increase in the management and maintenance costs of the excavators.

One purpose of the present invention is to achieve a tooth for buckets of excavators, or similar equipment, wherein the stresses to which the point is subjected are discharged in a zone of high resistance of the point-bearer, so as to reduce the wear, the damage and the breakages done to the point-bearer and the pin element.

Another purpose of the invention is to achieve a tooth which allows a precise coupling of the point and the point-bearer, in any case facilitating the operations to assemble and dismantle the point in order to replace it.

The Applicant has devised and embodied the present invention to overcome the shortcomings of the state of the art in order to achieve the aforesaid purposes and to obtain other advantages.

#### SUMMARY OF THE INVENTION

The present invention is set forth and characterized essentially in the main claim, while the dependent claims describe other innovative characteristics of the

invention.

The tooth according to the invention comprises, like the teeth for buckets of a known type, a work element, or point, and a relative support element, or point-bearer; 5 the support element consists in a single piece of a main body and a front protrusion able to be inserted in a mating cavity made at the rear of the work element, so as to define a coupling condition of the work element itself and the support element, in which the latter are able to 10 be reciprocally clamped by inserting pin means into a relative housing seating.

According to a characteristic of the present invention, the work element comprises at least a fin, or appendix, protruding from the rear with respect to the relative 15 cavity, able to couple with the main body of the support element; the housing seating for the pin means is made partly on the appendix and partly in the main body.

In a preferential embodiment, the work element comprises two fins, parallel to each other and 20 symmetrical with respect to a median longitudinal axis of the work element, defined by an extension of the lateral walls of the cavity.

Said fins are substantially shaped like a prism with a trapezoid base and are able to be arranged in mating 25 recesses of the main body defining a relative upper edge.

In the coupling condition between the support element and the work element the tooth according to the invention normally has a first slit between the upper profile of the fins and the upper edge of the mating recesses.

30 According to a variant, in said coupling condition, between the lower segment of the main body and the wall that defines at the lower part the cavity of the work element, there is a second slit of a width greater than

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the first slit.

In a preferential embodiment of the invention, the housing seating of the pin means is defined by a through hole, made on the main body, and by two apertures, each  
5 one made on a relative fin, able to be put in cooperation with said through hole.

According to another characteristic of the present invention, between the pin means inserted in the relative housing seating and the lower edge of said apertures  
10 there is a gap with an amplitude greater than the width of the first slit.

Moreover, in the coupling condition between the work element and the support element and with the pin means not inserted, the apertures of the fins are slightly off-  
15 center, towards the front protrusion, with respect to the through hole, so that the insertion of the pin means into said housing seating determines the alignment of said apertures and the through hole and a further penetration of the front protrusion into the mating cavity.

20 Advantageously, said pin means are axially hollow and have a longitudinal through cut able to allow a partial elastic deformation of their section.

In a preferential form of embodiment, the front protrusion of the work element has a substantially  
25 polygonal transverse section, for example square, hexagonal or suchlike, which progressively reduces from its rear end, that is, facing towards the main body, to the front end.

According to a variant, said front protrusion has at  
30 least a longitudinal groove on one face.

#### BRIEF DESCRIPTION OF THE DRAWINGS

These and other characteristics of the present invention will become apparent from the following

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description of a preferential form of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 shows a bucket provided with teeth according to the invention;
- fig. 2 is a three-dimensional view of a tooth for buckets according to the invention;
- fig. 3 is a lateral view of the tooth in fig. 2;
- fig. 4 is an exploded view of the tooth in fig. 2;
- 10 - fig. 5 is a lateral view, partly in section, of a tooth for buckets according to the invention in a variant embodiment;
- fig. 6 is a section from A to A of fig. 5;
- fig. 7 is a section from B to B of fig. 5;
- 15 - fig. 8 is a section from C to C of fig. 3;
- fig. 9 shows a variant of fig. 3.

#### DETAILED DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT OF THE INVENTION

With reference to the attached drawings, the reference number 10 denotes the tooth according to the invention for buckets 11 of excavators or similar equipment.

Said tooth 10 comprises a point-bearer 12, able to be attached in a known manner to the lower side 11a of the bucket 11, and a point 13 able to be associated due to their coupling shape at the front of the point-bearer 12 and able to be clamped on the latter by means of a pin 17.

To be more exact, the point-bearer 12 defines in a single piece a main body 14, at the rear, able to be positioned above the lower side 11a of the bucket 11, and a front protrusion 15, wedge-shaped, able to be inserted in a cavity 16, of mating shape, made on the rear of the point 13, interfering with the inner surface of the

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cavity 16.

In the embodiment shown in figs. 4 and 8, the front protrusion 15 has a substantially hexagonal transverse section, with two lateral grooves 23.

5 In the embodiment shown in fig. 7, instead, the front protrusion 15 has a substantially square transverse section, with two grooves 23 respectively on the upper and lower face.

10 The pin 17 is advantageously axially hollow and has a longitudinal cut 17a which allows a partial elastic deformation of the section.

According to a characteristic of the present invention, the lateral walls 18 of said cavity 16 extend beyond the latter, defining two protruding fins, or appendixes, 19; 15 said fins 19, in the condition wherein the front protrusion 15 is inserted in said cavity 16, are able to house in corresponding recesses 22 of the main body 14, so as to overlap with the latter.

In this case, the fins 19, substantially configured as 20 a prism with a trapezoid base, have at the upper part respective hollows 19a of a width substantially equivalent to the diameter of the pin 17; said hollows 19a are able to align with a through hole 21, made transversely in correspondence with the recesses 22 of 25 the main body 14, and of a diameter substantially equivalent to that of the pin 17, in order to define therewith a housing seating 20 for the pin 17.

The insertion of the pin 17 in said housing seating 20 determines the constraint of the point 13 and the point- 30 bearer 12, preventing the separation thereof.

Advantageously, in the coupling condition of the point 13 and the point-bearer 12, the hollows 19a have the relative axis slightly off-center, towards the front

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protrusion 15, with respect to the axis of the hole 21; for this reason, the insertion of the pin 17 into the seating 20 draws the point 13 on the point-bearer 12, determining a further penetration of the front protrusion  
5 15 into the cavity 16 and hence an increase in interference between the two, making the clamping of the point-bearer 12 and point 13 more stable and secure.

In such coupling condition, between the upper profile 19c of the fins 19 and the upper edge 22a of the  
10 respective recesses 22, there is a first slit 24, of a width in the range of some tenths of a millimeter, while between the lower segment 14a of the main body 14 and the lower wall 25 of the cavity 16 there is a second slit 26 of a slightly greater width; between the pin 17 and the  
15 lower edge 19d of the hollows 19a there is also a gap 27 slightly larger than the width of said first slit 24.

According to a variant, shown in fig. 9, instead of the hollows 19a the fins 19 have respective through eyelets 19b, which have the same function; said through eyelets  
20 19b are arranged substantially vertical and are able to align with a hole 21 made in a more central position on the main body 14 of the point-bearer 12.

When the bucket 11 is in use, the load "P", weighing on the front part of the point 13, determines a moment which  
25 tends to make the point 13 rotate with respect to the point-bearer 12, in the direction of the arrow indicated by the letter "R" (figs. 3 and 5), taking the upper profile 19c of the fins 19 to abut on the upper edge 22a of the recesses 22, so as to discharge at least a part of  
30 the stresses deriving from the load "P" on the main body 14.

The absence of holes on the front protrusion 15 makes the latter more resistant to such stresses, preventing or

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limiting damage thereto.

Moreover, the lower edge 19d of the hollow 19a approaches the pin 17, but without coming into contact with it, so that the same pin 17 is not substantially  
5 affected by the shearing forces deriving from the load "P", thus considerably reducing the risks of breakages.

The tooth 10 according to the invention therefore allows a better distribution on the point-bearer 12 of the stresses deriving from the load "P" weighing on the  
10 point 13, limiting the forces affecting the pin 17.

This ensures a greater duration and greater effectiveness of the tooth 10, reducing the need for interventions of replacement and/or maintenance on the bucket 11.

15 It is clear, however, that modifications and/or additions of parts may be made to the tooth 10 for buckets 11 as described heretofore, without departing from the scope of the present invention.

For example, the front protrusion 15 could have a  
20 rhomboid or pentagonal section, or otherwise.

Or the pin 17 could be of a different type with respect to the one shown here.

It is also clear that, although the present invention has been described with reference to specific examples, a  
25 person of skill in the art shall certainly be able to achieve many other equivalent forms of tooth for buckets, all of which shall come within the scope of the present invention.